

Application No.: 10/776852
Amendment dated: May 18, 2005
Reply to Office action of March 1, 2005

REMARKS/ARGUMENTS

Claim 1 has been amended to incorporate the substance of claim 3, with a clarifying change, namely a recitation that the crankshaft sprocket and the large camshaft sprocket are the *only* sprockets around which the driving chain is wrapped.

Claim 1, as amended, now defines a drive in which:

(a) the crankshaft sprocket and the large camshaft sprocket are the only sprockets around which the driving chain is wrapped; and

(b) the driving chain (i.e., the crank-to-cam chain) is stronger¹, and has a greater pitch, than the driven chain (i.e., the cam-to-cam chain.)

The subject matter of claim 1, as amended, is not shown to have been obvious by Shimano and Bianchi, or by any other combination of the prior art of record, for the reasons set forth below.

In Shimano et al., the timing chain 7 serves four cams, and consequently its strength requirement is greater than that of either of the sub-timing chains 15. It is important to contrast Shimano et al. with Okui et al. (6,250,266). In Okui, as pointed out previously, each crank-to-cam chain drives two cams, but the large camshaft sprocket 27 is twice the diameter of each of the small camshaft sprockets 34 and 36. Consequently, the cam-to-cam chain and the crank-to-cam chain sustain the same tensile load, and there is no motivation to make them different, either in strength or in pitch.

¹In the applicant's invention, the pitch diameters of the smaller camshaft sprockets can be more than one-half the pitch diameter of the larger camshaft sprocket. When this relationship exists, the cam-to-cam chain does not need to be as strong as the crank-to-cam chain.

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With the amendment requiring the crankshaft sprocket and the large camshaft sprocket to be the only sprockets around which the driving chain is wrapped, claim 1 is now directed to a camshaft drive configuration that corresponds to the configuration in Okui et al. rather than the configuration in Shimano et al.

Bianchi describes an arrangement in which a chain 17, which drives two camshafts, does not need to have the power-handling capability of chain 12, which drives not only the two camshafts, but also a fuel pump. Bianchi teaches that chain 17 can be sized for less power than chain 12, and that chain 12 can also have a smaller pitch than chain 12.

The applicant does not dispute that Bianchi may supply a motivation to make the strength and pitch of Shimano's chain 7 greater, respectively, than the strength and pitch of Shimano's chain 15. However, the result of such a modified version of Shimano would not correspond to amended claim 1, because Shimano's chain 7 is wrapped around the crankshaft sprocket and two large camshaft sprockets 11, not *only* around the crankshaft sprocket and one large camshaft sprocket. On the other hand, Bianchi supplies no motivation to make the chains of Okui different from each other; Okui's chains sustain the same tensile load, and therefore, even if Bianchi's teachings are taken into account, there is no reason to make Okui's chains different from each other.

Finally, referring to Japanese patent publication 2000-234505, recently cited² by the Japan Patent Office in connection with its examination of the Applicant's priority application 2003-113071, this reference describes a timing

² JP 2000-234505 was first cited in an in a communication from a foreign patent office on a counterpart foreign application on April 22, 2005, not more than 3 months prior to the filing of the accompanying information disclosure.

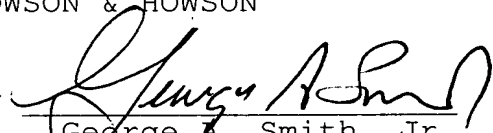
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chain configuration similar to that of Okui et al., but does not disclose the relationship of the strength and pitch of the driving chains to the strength and pitch of the driven chains. Consequently the Japanese patent publication does not add any information that tends to demonstrate obviousness of the invention as presently defined in claim 1.

Favorable reconsideration and allowance of this application are respectfully requested.

Respectfully submitted,
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Enclosures

- (a) information disclosure
- (b) copy of JP 2000-234505